MICHIGAN DEPARTMENT OF
ENVIRONMENT, GREAT LAKES, AND ENERGY

Earth Day 2022 Student Webinar:
Working Together to Address the Challenge of Climate Change

Correlation with Next Generation Science Standards* and Recommended Grade Band(s)

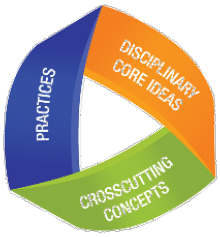
Guiding questions/phenomenon:

What factors contribute to a changing climate?
What impact do individuals have on those factors?

Michigan's K-12 Science Standards are based on the Next Generation Science Standards (NSGS), which the State of Michigan was a lead partner in developing. The webinar is intended to introduce grade levels K-12 to concepts relating to Earth Systems and Physical Science and to the Crosscutting Concepts of Cause and Effect, Patterns, Systems, and Stability and Change. Webinar content *supports* the achievement of learning targets in these areas, particularly when used in conjunction with the recommended pre- and post-webinar activities.

Climate change is only explicitly addressed in middle and high school science standards. Other NGSS alignments highlighted here are secondary or go above and beyond the assessment boundary of the indicated performance expectations.

For a detailed explanation of how climate change topics are addressed within NGSS standards across all grade bands, consult the following resource: How Learning About Climate Change Progresses in Next Generation Science Standards (K-12).



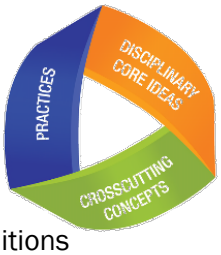
Elementary (K-5)

K-PS3-1. Make observations to determine the effect of sunlight on Earth's surface.

K-ESS2-1. Use and share observations of local weather conditions to describe patterns over time.

K-ESS3-3. Communicate solutions that will reduce the impact of humans on the land, water, air, and/or other living things in the local environment. *

Science & Engineering Practice	Disciplinary Core Idea	Crosscutting Concept
Planning and Carrying Out Investigations Planning and carrying out investigations to answer questions or test solutions to problems in K–2 builds on prior experiences and progresses to simple investigations, based on fair tests, which provide data to support explanations or design solutions. • Make observations (firsthand or from media) to collect data that can be used to make comparisons. (K-PS3-1) (K-ESS2-1) Obtaining, Evaluating, and Communicating Information Obtaining, evaluating, and communicating information in K–2 builds on prior experiences and uses observations and texts to communicate new information. • Communicate solutions with others in oral and/or written forms using models and/or drawings that provide detail about scientific ideas. (K-ESS3-3)	**PS3.B: Conservation of Energy and Energy Transfer** Sunlight warms Earth's surface. (K-PS3-1) ESS2.D: Weather and Climate Weather is the combination of sunlight, wind, snow or rain, and temperature in a particular region at a particular time. People measure these conditions to describe and record the weather and to notice patterns over time. (K-ESS2-1) ESS3.C: Human Impacts on Earth Systems Things that people do to live comfortably can affect the world around them. But they can make choices that reduce their impacts on the land, water, air, and other living things. ETS1.B: Developing Possible Solutions Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people. (secondary)	**Cause and Effect** Events have causes that generate observable patterns. (K-PS3-1), (K-WSS3-3) Patterns Patterns in the natural world can be observed, used to describe phenomena, and used as evidence. (K-ESS2-1)



Elementary (3-5)

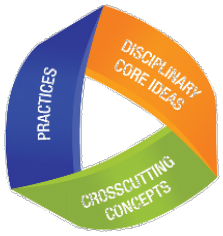
3-ESS2-1. Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season.*

3-ESS2-2. Obtain and combine information to describe climates in different regions of the world.

5-ESS3-1. Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.

Science & Engineering Practice	Disciplinary Core Idea	Crosscutting Concept
Analyzing and Interpreting Data Analyzing data in 3–5 builds on K–2 experiences and progresses to introducing quantitative approaches to collecting data and conducting multiple trials of qualitative observations. When possible and feasible, digital tools should be used. • Represent data in tables and various graphical displays (bar graphs and pictographs) to reveal patterns that indicate relationships. (3-ESS2-1) Obtaining, Evaluating, and Communicating Information Obtaining, evaluating, and communicating information in 3–5 builds on K–2 experiences and progresses to evaluating the merit and accuracy of ideas and methods. • Obtain and combine information from books and other reliable media to explain phenomena. (3-ESS2-2) • Obtain and combine information from books and/or other reliable media to explain phenomena or solutions to a design problem. (5-ESS3-1)	**3-ESS2.D: Weather and Climate** Scientists record patterns of the weather across different times and areas so that they can make predictions about what kind of weather might happen next. (3-ESS2-1) Climate describes a range of an area's typical weather conditions and the extent to which those conditions vary over years. (3-ESS2-2) 5-ESS3.C: Human Impacts on Earth Systems Human activities in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, ocean, air, and even outer space. But individuals and communities are doing things to help protect Earth's resources and environments. (5-ESS3-1)	**Patterns** Patterns of change can be used to make predictions. (3-ESS2-1),(3-ESS2-2) Systems and System Models A system can be described in terms of its components and their interactions. (5-ESS3-1)

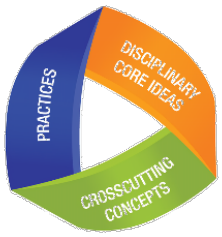
*[Clarification Statement: Examples of data could include average temperature, precipitation, and wind direction.] [*Assessment Boundary: Assessment of graphical displays is limited to pictographs and bar graphs. Assessment does not include climate change.*]



Middle School (6-8)

MS-ESS3-5. Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century.

Science & Engineering Practice	Disciplinary Core Idea	Crosscutting Concept
Asking Questions and Defining Problems Asking questions and defining problems in grades 6–8 builds on grades K–5 experiences and progresses to specifying relationships between variables and clarifying arguments and models. • Ask questions to identify and clarify evidence of an argument.	**ESS3.D: Global Climate Change** Human activities, such as the release of greenhouse gases from burning fossil fuels, are major factors in the current rise in Earth's mean surface temperature (global warming). Reducing the level of climate change and reducing human vulnerability to whatever climate changes do occur depend on the understanding of climate science, engineering capabilities, and other kinds of knowledge, such as understanding of human behavior and on applying that knowledge wisely in decisions and activities.	**Stability and Change** Stability might be disturbed either by sudden events or gradual changes that accumulate over time.



High School (9-12)

HS-ESS3-1. Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.

HS-ESS3-4. Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.

Science & Engineering Practice	Disciplinary Core Idea	Crosscutting Concept
Constructing Explanations and Designing Solutions Constructing explanations and designing solutions in 9–12 builds on K–8 experiences and progresses to explanations and designs that are supported by multiple and independent student-generated sources of evidence consistent with scientific knowledge, principles, and theories. • Construct an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future. (HS-ESS3-1) • Design or refine a solution to a complex real-world problem, based on scientific knowledge, student-generated sources of evidence, prioritized criteria, and tradeoff considerations. (HS-ESS3-4)	**ESS2.D: Weather and Climate** Current models predict that, although future regional climate changes will be complex and varied, average global temperatures will continue to rise. The outcomes predicted by global climate models strongly depend on the amounts of human-generated greenhouse gases added to the atmosphere each year and by the ways in which these gases are absorbed by the ocean and biosphere. (secondary to HS-ESS3-6) ESS3.C: Human Impacts on Earth Systems Scientists and engineers can make major contributions by developing technologies that produce less pollution and waste and that preclude ecosystem degradation. (HS-ESS3-4) ETS1.B: Developing Possible Solutions When evaluating solutions, it is important to take into account a range of constraints, including cost, safety, reliability, and aesthetics, and to consider social, cultural, and environmental impacts. ((secondary HS-ESS3-4)	**Cause and Effect** Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects. (HS-ESS3-1) Stability and Change Feedback (negative or positive) can stabilize or destabilize a system. (HS-ESS3-4)